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Focusing on Africa's lubrication needs

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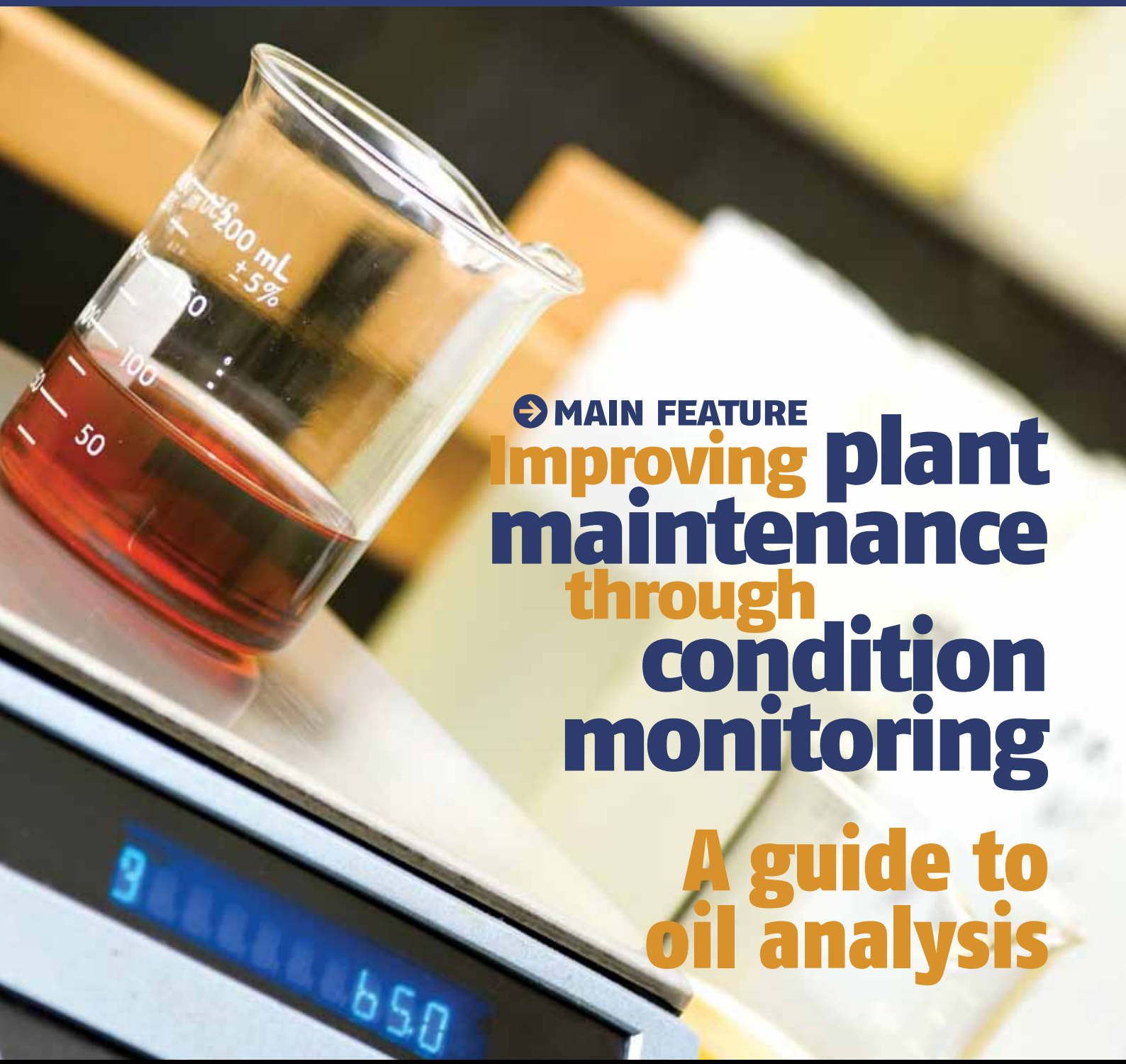

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Improving plant maintenance through condition monitoring

A guide to oil analysis

PLUS: THE MARKET REPORT P.4

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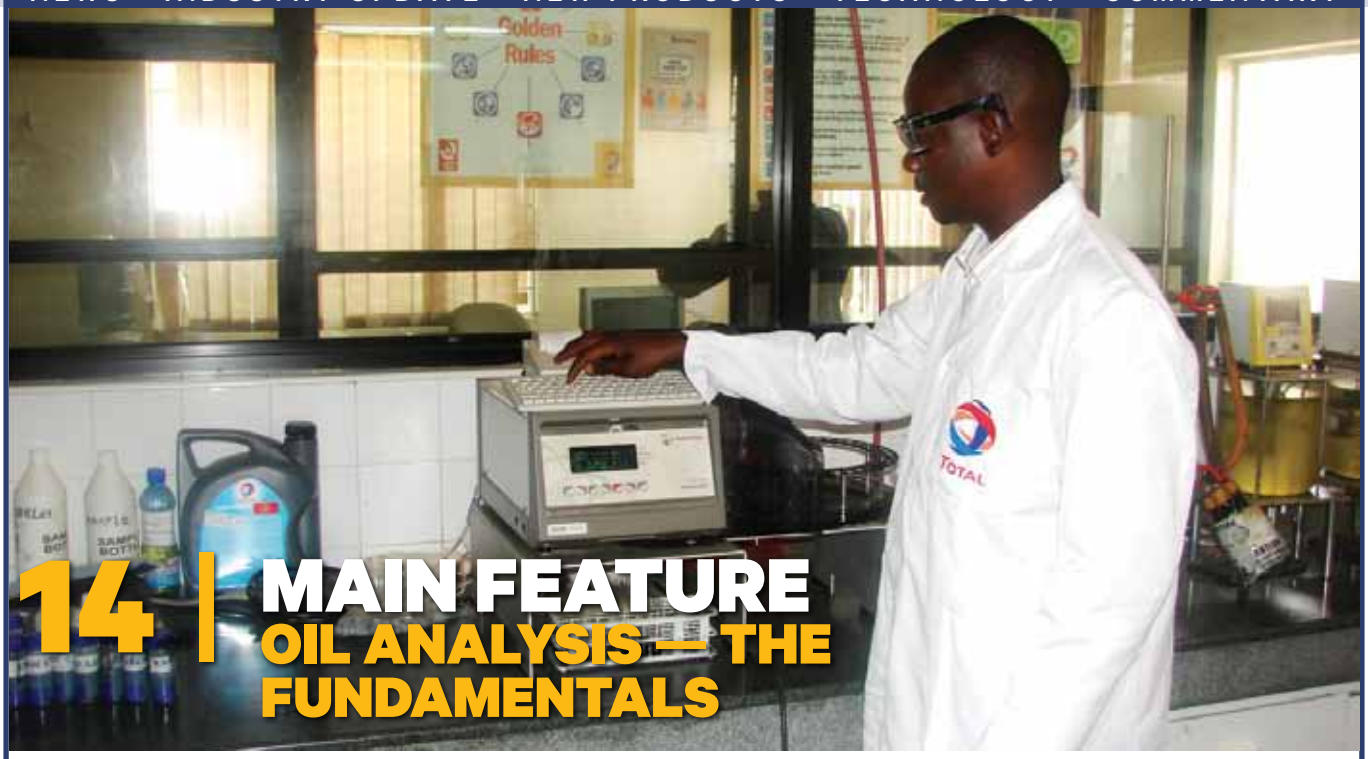

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EDITORIAL

One year and still counting!

Welcome to volume four of Lubezine magazine. This edition is a major landmark in the young history of the magazine as it marks one year since Lubezine came to the scene. Thanks to our loyal advertisers and contributors, this magazine has consistently rolled off the press every quarter and continues with its objective of informing the industry on matters technology and new developments in market.

One year is a long time for a dynamic market like this one. Many things have changed and only those marketers willing to change with the shifting dynamics will find the going bearable. To mention but a few of these changes, ownership of major lubricant marketing companies have changed or are in the process of changing ownership, the emergence of independent oil marketers has continued with each bringing on board their range of lubes and thus intensifying the competition, multi-nationals that had earlier exited from the region are keen to reintroduce their lubricants through distributors, etc.

Lubezine has been part and parcel of these changes by being one of the most trusted sources of information in the market for lubricant end-users, lube marketers and other associated suppliers. Looking ahead, Lubezine is determined to continue playing a central role in informing and bringing technology news to the industry.

Preventive maintenance remains the surest way of optimizing plant operations. Fluid condition monitoring constitutes one of the best available tools of continuously monitoring the machinery health with an objective of avoiding expensive breakdowns and down times. We extensively look at how and why condition monitoring needs to be done. An in-depth look at one way of monitoring the condition of the lubricant in service through oil analysis is featured.

In this edition we feature GfK, an international research company that has carried out a consumer choice survey on lubricants. The survey was conducted in Kenya's retail sector consisting of small to medium sized spare shops, to measure which lubricant grades, brands, packs and prices are prevailing in the market. The research was significant in that it sought to establish end-user preferences at the retail outlets. Any lubricant marketer interested in understanding how this sector is evolving will definitely find the research report useful. ■

Thanks to our loyal advertisers and contributors, this magazine has consistently rolled off the press every quarter and continues with its objective of informing the industry on matters technology and new developments in market.

Joseph Ndung'u

WHO IS READING LUBEZINE?

Lubezine is a free magazine to qualified subscribers

The readership includes:

- Users of lubricants in industrial, transport and aviation sectors.
- Lubricants manufacturers and marketers.
- Suppliers of lubricants packaging materials.
- Suppliers of lubrication equipments.

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See also Oil degradation P.22

TARIFFS

EAC to remove preferential tariff treatment on lubes produced within EAC block

The East African Community trading block comprises of five countries two of which blend lubricants. Kenya and Tanzania have fully fledged blending plants that produce various grades of lubricants. These are then exported to other EAC member countries like Burundi, Rwanda and Uganda. Additionally, some lubricants blended in Kenya are exported to Tanzania and vice versa. The product are also exported to other non-EAC member countries such as Ethiopia, DRC, Djibouti, South Sudan and Zambia.

According to the EAC rules of origin, products produced within the block can be exported to member countries at preferential tariff treatment. Generally, this means that the products will be exempted from duty payment.

In February of this year, a team comprising custom experts from Rwanda, Burundi, Tanzania , Uganda and Kenya concluded a research whose objectives was to study the production process and establish the extent of transformation and ascertain if the lubricating oils produced within the block qualify for preferential tariff treatment in accordance with the provisions of the EAC origin. The EAC secretariat was represented by customs officer in charge of tariffs and valuation, Mr. Ally Alexander. The experts visited two blending plants in Tanzania namely Oryx oil and Petrolube and those in Kenya namely Oilibya and Kenya Shell.

To determine how much value addition was incurred in blending lubricants in the region, the costs of the products were broken down into the cost of base oils, additives, packaging materials , direct labour ,cost, direct expenses, overheads, production losses and other miscellaneous expenses. With the exception of base oil and additives cost, all the other costs were taken to be value addition costs. For most products the percentage value addition was ranging from 33% to 34%. The minimum value stipulated by the commission is 40% value addition.

Consequently the team of experts concluded that most lubricants produced in the region do not meet the value addition threshold required to qualify for preferential treatment under the EAC rules of origin. ■

NEW PRODUCT

Motorol Lubricants Open Shop In Kenya

OIL ZONE FZE, one of the leading lubricants manufacturers based in UAE has opened up shop in Kenya where it is trading as OILZONE (EAST AFRICA) LTD.

The company markets lubricants under the brand name "Motorol". With its headquarters located along Mombasa road, the company is also serving Uganda and plans to venture into the Tanzanian market soon.

MOTOROL lubricants foray in the oil segment began in 1970 in India. OILZONE FZE was established as a lubricants manufacturing and blending unit in the year 2004, manufacturing and marketing the products under the brand name of MOTOROL lubricants." We are equipped with state of the art manufacturing facilities and a highly trained professional work force with more than 3 decades of experience," said the country operations manager, Mr. Jitesh Barot

According to Mr. Jitesh, the innovative technical team at MOTOROL Lubricants has been responsible for development of about 120 grades of high quality lubricants and Specialty products. The range includes automotive, industrial and specialty oils such as printing ink oil and aluminum rolling oil.

Mr. Jitesh affirms that the company's ability to offer better stock management along with shipping time means that the company can process orders quickly and ensure faster delivery times.

This helps in achievement of the company's motto "Nobody benefits more than a MOTOROL Lubricants Customer". ■

Turn to P.20

"Sometimes packaging is so important that it cost more than the product itself in order to lure the consumers to buy it."

KenolKobil service station in Nairobi

TAKEOVER

Puma Energy plans buyout of KenolKobil

Swiss oil firm Puma Energy has kicked off its bid for a 100 percent takeover of KenolKobil with a declaration that it intends to offer minority shareholders the option of selling their shares through a mandatory general offer. Once Puma Energy acquires all available shares, the oil marketing firm will effectively change status from a public to a private company.

KenolKobil, which operates in 10 African countries, raised its pretax earnings by 74 percent last year to 4.9 billion shillings ($58.93 million). KenolKobil markets Kenol, Kobil and Castrol lubricant brands in the African market. These lubricants are blended in Mombasa, Kenya and in Ndola, Zambia. The Mombasa Plant serves the East Africa Communities (EAC) member countries as well as Eastern DR Congo, South Sudan and Somalia. The Zambia Blending Plant in Ndola serves Central African countries of Zambia itself and Lubumbashi in the Katanga Region of Southern Congo DR.

Puma Energy is already operating in a number of countries in Africa where it is trading in the middle and downstream markets. These countries are Ghana, Angola, Botswana, Côte d'Ivoire, DRC, Namibia, Zambia and South Africa. Through the acquisition of BP's operations in southern Africa, Puma Energy acquired distributorship of Castrol lubricants across five African countries of Botswana, Namibia, Malawi, Tanzania and Zambia. Puma Energy also markets its own brand of lubricants, Puma Lubricants, covering a wide application range.

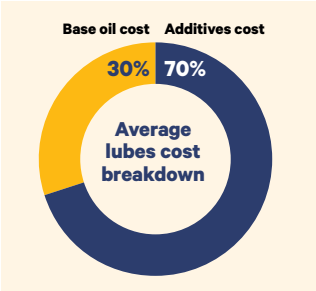
Puma Energy is a subsidiary of Trafigura, the third largest petroleum trading company in the world which has interests in oil, coal and shipping among others. ■

STANDARDS

Additives exempted from PVoC standards

According to the latest HS Code Kenya PVoC (Pre-Export Verification of Conformity to Standards) regulated product list, additives for lubricating oils have been exempted from PVoC regulations. Additives for lubricating oils fall under the EAC HS code 3811.19.00 and previously required pre-shipment inspection before being imported into the country.

Some industry players feel that this exemption could cause problems in the industry because the pre-shipment inspection allowed for an independent check and control on the quality of additives



that are allowed into the country against international standards. Locally blended lubricants account for over 85% of the total requirements of the country and many players are switching to local blends due to the economies of scale (Duty savings where raw materials attract a duty of 10% whereas finished lubricants mostly attract 25%). With approximately 70% of the cost of a finished lubricant attributed to the cost of additives, this shows the importance of having control of the same. ■

See also P.14

Oil analysis — the fundamentals

QUESTIONS FROM OUR READERS

OUR EXPERTS TACKLE ALL YOUR QUERIES

Q We have noted colour changes in the oils we receive. Sometimes the oil is light colored, cloudy or darker, what causes this? — *William Karenga*

Most oils have different colour characteristics. There are various reasons why an oil would have a different colour from another one.

For most of the oils made from Group I mineral base oil, slight changes in colour or darkness often occur due to differences in crude stock determined by the crude source. Colour marks in mineral oils are generally associated with sulfur or aromatic impurities. The darker the base oil, the more of these impurities you usually find. Mineral oils with higher viscosity often are characterized with darker colours.

Certain additives can also contribute to colour, especially those containing sulfur. A good example is detergents such as calcium sulfonate which can considerably darken a finished oil.

If your lubricant supplier has made a formulation change, this can lead to a corresponding colour change.

It is important that lubricant suppliers disclose planned formulation changes to their customers in advance to avoid any panic due to the same. If one receives an out of norm delivery which is cloudy, whilst previous deliveries have been clear and bright, some common issues can be attributed to this such as:

1. Insoluble additives (blend plant or storage stability problems)
2. Water contamination in the oil
3. Accidental cross-mixing of lubricant types where additives or base oils have clashed
4. Solid impurities in the oil
5. Low cloud point (wax crystallization)

It is advisable when in doubt to contact your lubricant supplier for clarification and an analysis can be done to resolve this. ■

Q Are synthetic automotive engine oils compatible with mineral and other synthetic engine oils? Are they capable to extend drain intervals? — *Peter Mulwa*

Yes, synthetic oils for passenger cars and light trucks use are fully compatible with petroleum oil and other synthetic lubricants. But, even though they are compatible it is best not to mix different brands of oil.

Each brand of oil has a specific chemistry and additive package and two different oils mixed together may result in loss of optimal performance as they were engineered to if the chemistries of the oil becomes offset by mixing with another brand of oil.

It is advisable to drain your oil completely and charge the system with new oil to be able to get all the benefits of the new oil.

On the issue of extending the drain interval, some are and some are not capable. The only way to confirm, is to check the OEM(Original Equipment Manufacturer) specifications and the oil manufacturers specifications. This can also be verified by oil analysis testing at different intervals during use which can give the estimated extended drain interval an oil can reach.

If by-pass filtration and oil analysis is used, then drain intervals can be extended until the lab results indicate the oil needs to be changed. This can be several thousands of kilometres depending on the variables. However, to gain a long drain interval, several other issues need to be addressed to avoid compromising the engine performance and life at the expense of the long drain interval.

The air filtration system and oil filtration system should be in the best condition to gain the benefit.

Q What does EP mean in a gear oil? — *Benson Kiprop*

EP means extreme pressure and refers to an additive used in gear oils. This additive is designed to stop metal-to-metal contact taking place between transmission components like the gears themselves. The EP additives are usually based on sulphur and phosphorous i.e. sulphur-phosphorous compounds. These elements bond to the metal surfaces where there are points of extreme pressure and temperature, forming a chemical layer which wears out avoiding Metal-to metal contact.

This additive gives the oil some characteristic smell hence it is easy to know that the oil has the EP additive. Worth to note is that one should not use gear oil with high treat of EP additives in gear boxes with yellow metals like brass and bronze. The EP Additives can react with the yellow metals and cause problems. Ideally, gear oils meeting API GL-4 would be okay for such applications. ■

We encourage technical questions from our readers. Lubezine's team of lubricants specialist will be on hand to answer your queries. E-mail: info@lubesafrica.com

EAST AFRICA

Uganda lubricants market – a brief overview

By Edwin Kamau

The Ugandan economy is considered to be amongst the fastest growing economies in the world and in Africa in particular. With this growth, comes an increase in the usage of automobiles and machineries, with new industries being set up day-in and day-out.

The lubricants market has seen a steady growth from the days when it was dominated by multinationals to the current situation where there are numerous independent lubricants suppliers with a sizeable market share. The notable lubricants brands include Total, Shell, Enoc, Fuchs, Engen, Valvoline, Kobil, Mogas International and Hass.

Just like in other countries in the region, cheap, low quality products have flooded the Ugandan market and this is evidenced by the many such lubricants available in downtown Kampala areas of Kiseka market. This area is the hub of retail lubricants business in the country. Here, the movement of a brand is solely determined by the mechanics and their opinion moves the market.

Nevertheless, increased awareness and use of top of the range vehicles have seen the Ugandan market demanding the latest specifications of oil including fully synthetic lubricants like 5w 30 and 10w 40. Companies like Cooper Motors who deal in vehicles like the Range Rover and Suzuki are now using oils like 5W20 and 5W30. Enoc lubricants, through its distributor CITY LUBES have launched into the market 5W 30 which is a fully synthetic lubricant.

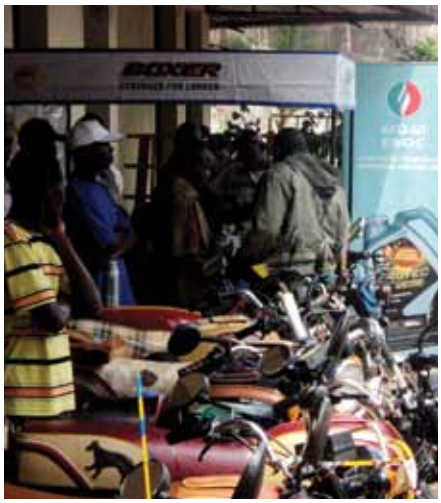
Four Stroke Motor Cycle Oils Gains Prominence in Ugandan Market

Though the use of two wheelers in Uganda has been gaining popularity for the last 10 years ,the lubricants marketers have not been moving in to capitalize on this and the servicing of the motorcycles has been left to the prerogative of the mechanics who use any oil as long as its friendly to their pockets.

With a shift from two stroke to four stroke motorcycles, the oil of choice has been motor oils and specifically monograde such as SAE 50. But this is changing thanks to the introduction of four stroke motorcycle specific oils by notable lubes marketers. These include, Protec 4T from Enoc Lubricants, Special 4T oil from Total and Reliance 4T by Gapco. Additionally , VERMACO, a local dealer of 4 stroke motor cycles (Bajaaj) has also introduced own label of 4T oil .The motorcycle oil sector has become the most competitive segment and this has seen lubricant marketers conducting town by town service clinics, to popularize their brands. ■

— Edwin Kamau works for City Lubes(U) Ltd. City lubes is the authorised distributor of ENOC lubricants in Uganda.

The lubricants market seen a steady growth from the days when it was dominated by multi-nationals to now when there are numerous independent lubricants suppliers with a sizeable market share



Participants in a training workshop organized by City Lubes, displaying 4T oil from Enoc. Use of 4T oil is growing in the Ugandan market. Below: Motorcycle service clinic by City Lubes in Kampala.

AUTO COMPONENTS

Turbochargers and lubrication

By Joseph Ndung'u
Mr Ndung'u has been working in the lubricants industry for the past 8 years in area of Sales & Marketing and Technical support

A turbocharger is a radial fan pump driven by the energy of the exhaust gases of an engine. It consists of a turbine and a compressor on a shared shaft. The turbine converts the heat energy from the exhaust to power, which then drives the compressor, compressing ambient air and delivering it to the air intake manifold of the engine at higher pressure, resulting in a greater mass of air entering each cylinder. The additional oxygen makes it possible to add more fuel, increasing the power and torque output of the engine while reducing emissions

The function of a turbo charger is to increase the power output of an engine by up to 30%, without adjusting the engine itself. It therefore improves on the size- to output efficiency of an engine. Typically, an engine would have to be made larger and consequently heavier to gain power; on the other hand, a turbo charger is much smaller and lighter. Additionally, a turbo charger is powered by the exhaust gases of the engine, which would normally just leave the engine and vehicle unused.

The construction and operation of a turbocharger places considerable strain on the lubricating oil. The lubrication system plays an essential role in prolonging the life expectancy of a turbocharger by lubricating, cooling, and cleaning the bearings. Issues associated with lubrication have been identified as contributing close to 40 % of all failures of the turbochargers.

A turbo charger consists of free-floating rotational type journal bearings that float on a six-to-nine micron film of oil. A free-floating bearing revolves around both bearing and shaft, and bearing and bearing housing. The shaft and bearings must soar on a constant, clean film of

COMMON CAUSES OF LUBRICATION FAILURE

The following problems associated with lubrication can lead to turbochargers failures:

- Low engine oil pressure or levels
- Oil deterioration
- Blocked oil supply or drain lines
- Contaminated lubricant
- Improper start-up and shutdown procedure

Lack of Lubricant

Oil not only lubricates the turbocharger's spinning shaft and bearings, it also carries away heat. When oil flow stops or is reduced, heat is immediately transferred from the hot turbine wheel to the bearings, which are also heating up because of the increased friction due to the lack of oil. This combination causes the turbocharger shaft temperature to increase rapidly. If oil flow does not increase and the process continues, bearings will fail. Once the bearings fail (which can happen in just seconds) seals, shaft, turbine and compressor wheels can also be damaged. Turbo charger failure due to lack of oil can be identified by the blue coloration on the bearing or shaft.

The principle causes of turbocharger bearing lubrication problems are low oil pressure , a bent, plugged or undersized oil lube supply line, or plugged or restricted oil galleries in the turbocharger.

Oil levels and pressure should always be closely monitored and all worn hoses and lines should be replaced. The turbocharger oil supply line should be checked frequently to make sure it is not kinked or bent and it should always be replaced with a line of equal size, length and strength.

Improper start-up and shutdown procedure

The easiest way to damage a turbocharger is through improper start-up and shutdown procedures. The engine should be left to idle for at least 30 seconds (no load) after start-up and before shutdown. Warming the engine up before applying a load allows oil pressure to build up and lines to fill with oil.

Idling the engine before shutdown allows the engine and turbocharger to cool. "Hot" shutdowns can cause the turbocharger to fail because after high-speed operation, the turbocharger will continue to rotate long after the engine has been shut off and oil pressure has dropped to zero. This will cause heat to build up and possible bearing damage. It can also cause carbon and varnish deposits to form.

Oil deterioration

The high temperatures that are present in modern diesel engines can cause oils to breakdown. This action produces carbonaceous materials, which stick to the engine parts. Oxidation is caused by the hydrocarbons in the oil mixing with the oxygen; this produces organic acids of which there are two main types: those with low boiling points and those which are highly corrosive.

These products are responsible for several of the problems on diesel engines and turbochargers. If the acids are allowed to become concentrated, they will attack the bearings etc., causing pitting and subsequent failure. Also, they will be responsible for sludge formation in the oil; this is then deposited throughout the engine, particularly in the filters aggravating the turbocharger oil supply. Heavier oxidation causes hard varnish to appear. Where sludge is allowed to accumulate in the oil systems, as this passes through the turbo it is thrown by centrifugal force from the rotating shaft against the walls and internal surfaces of the bearing housing where it can stick and impede the free oil flow. In time the build-up will cause problems with oil drainage, resulting in oil leaking from the turbine end of the unit. If this matter is allowed to accumulate on the turbine side, the heat will cause a baking of the oil to take place and the result is usually imbalance in the turbocharger system.

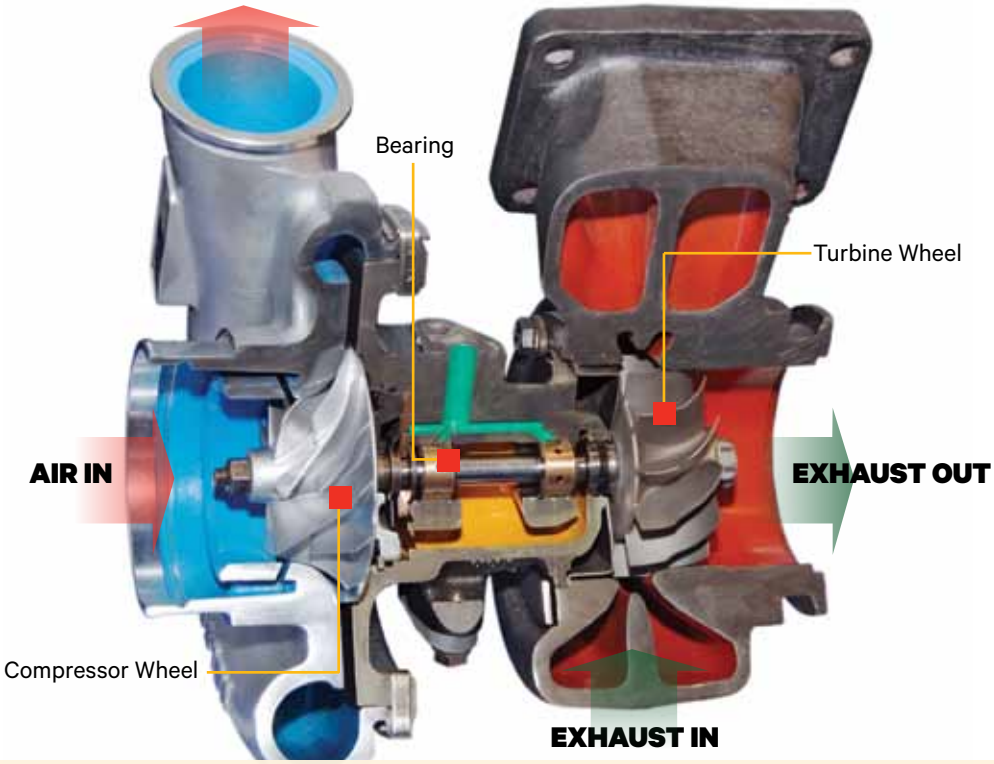
Restricted oil Drainage

A turbocharger can be damaged by restricted lube oil drainage. The lubricating oil carries away heat generated by friction from the bearings and from the hot exhaust gases. If drainage back to the sump is impeded, the

See also P.18

Consumer choices lubricants survey – GFK

Cut-away section of a turbocharger



oil to prevent direct contact with each other which would result in damage. Any lack of oil flow or foreign contaminant, i.e. dirt, sand, or metal shavings in the oil will cause excess wear and/or scaring on the bearing surfaces. This wear will often increase the clearances between rotating components resulting in excess shaft motion. A large amount of shaft motion is harmful to the life of a turbocharger.

Additionally, the basic operation of a turbocharger encompasses a turbine and a compressor on a common shaft. The turbine is driven by exhaust gas, which in turn drives the compressor that injects compressed air into the engine. This shaft can rotate up to 170,000 RPM. A lack of sufficient lubrication at such high speeds will have dire consequences. The exhaust gases temperature can reach 500°C which can easily break down the oil. ■

bearings will overheat and get damaged which will lead ultimately to its failure. There are two primary reasons for restricted drainage. A blocked drain tube, due to either damage or a buildup of sludged oil or high crankcase pressure which can be due to restricted crankcase breather or excessive engine blowby.

The turbocharger should be periodically checked to ensure that the oil drain tube and engine breather tube are free from damage or restriction. Correction of these conditions leads to longer turbocharger life.

Abnormally High Exhaust Temperatures

Elevated exhaust temperatures cause coking of oil which can lead to bearing failure. Extreme over-temperature operation can cause wheel burst. There are two basic causes of abnormal temperatures. The first is restricted air flow and the second is overpowering the engine. In either case the engine has more fuel than available air for proper combustion, this over fueled condition leads to elevated exhaust temperatures.

Causes of restricted air flow can include damaged inlet piping, clogged air filters, excessive exhaust restriction, or operation at extreme altitudes. Overpowering generally is due to improper fuel delivery or injection timing. If over temperature operation has been identified, an inspection of the air inlet and exhaust systems should be performed. The fuel delivery and timing should also be checked.

Oil Contamination

Another cause of turbocharger failure is contaminated oil. It can be caused by a worn or damaged oil filter or not changing the lube oil at recommended intervals. Expecting the oil filter to remove dirt, sand, metal chips, etc. from the oil before they reach the engine or turbocharger can be a costly mistake because contaminated oil may completely bypass the engine oil filter if the oil filter or oil cooler is clogged, if the filter element is improperly installed, or if the oil is thick during cold weather. The particles in the oil will cause bearing wear and bearing – housing bore wear or if the particles are large enough, they will block the oil passages thus starving unit of lubricant. To prevent oil contamination, the area around the oil fill cap should be cleaned before adding oil and the lubricant handling equipments and containers should be inspected to ensure that they are clean and free from dust or other harmful particles.

IMPORTANT PROPERTIES OF LUBRICATING OILS

Oil chosen for use in a turbo charged vehicle should at minimum exhibit the following characteristics:

1. It must be multigrade:

A multigrade oil, for example 15w- 40 flows easily during engine startup and does not thin out at elevated temperatures. The low temperature flow ability enables the oil to quickly reach the turbocharger at start up while the high temperature ensures the oil will not thin out and loose its viscosity at high temperatures.

2. It must have a high viscosity index:

When subjected to high temperatures, oil tends to lose its viscosity by some degree. The rate of this change is indicated by its viscosity index. A high viscosity index oil undergoes little change in viscosity with temperature increase while a low viscosity index oil has its viscosity changing by wide margin with temperature rise. With the high temperatures that are typical in turbochargers , the lubricating should process a viscosity index of above 100.

3. It should be of high performance grade:

High performance lubricants are formulated with premium quality additives to prevent oxidation and deposits build up. One should choose a lubricant that has a high API rating for example, API CI-4 for diesel engine oils.

PREDICTIVE MAINTENANCE

Lubrication and condition monitoring to improve plant availability

Eur.Ing. Andrew Monk. C.Eng. M.I.Mech.E., M.E.I.
Managing Director Lubrisolve Engineering Solutions Ltd.
www.lubrisolve.co.uk

PROFILE:

Andrew runs a Lubrication and Engineering consultancy, based in the UK, and has been involved in the application of lubricants for over 25 years in many different parts of the world. He is an experienced professional in all aspects of lubricants, lubrication, and lubricating equipment.

Holroyd acoustic Emission equipment being used on a fan bearing.

The basic principles

The manufacturing industry is no different from most other types of businesses in that the service that they provide, or the products which they produce, must ultimately deliver a profit. This is not always what happens in practice, of course, as any business can have a bad set of financial figures for any given year which may not be attributable directly to that particular business, but may be due to extraneous market forces. The size of any particular business determines whether that business can absorb a financially poor year or not.

However, the costs associated with running such a business can be many and diverse, and generally varying in magnitude in direct relation to the size of the respective plants themselves. A significant cost is naturally attributable to the actual equipment and plant used in the manufacturing process. In the case of a new plant, there is obviously the initial purchase price of the individual plant items and, prior to purchasing, an in-depth analysis has to be undertaken as to the predicted payback period. In other words, how long a particular item of plant has to be in operation, so as to be able to repay the initial amount

Condition monitoring is a natural partner to good lubricating practices and if we deem ourselves to be efficient and effective at one then it follows that we should be proficient at the other.

See also P.28

spent. It stands to reason therefore, that the higher the operating efficiency of the plant in question, the shorter the payback period and the sooner that item of the plant will start to operate at a profit.

After this initial payback period, the plant, which is part of the overall production process, has a running cost and if an item of plant is unable to support that production process, due to a malfunction, then it is costing that company money. The cost of that malfunction does not merely comprise of the replacement cost of the respective failed component parts, but also the associated labour costs and could well include lost production. These related downtime costs could be significant, and certainly higher than at first envisaged, depending on how much of the process is affected, particularly if other items of the plant are unable to function as a result. The entire production process, or a portion of it, could be put at risk. The additional costs of supporting services might also have to be taken into account, i.e. compressed air.

If an item of the plant has suffered an unplanned and unforeseen catastrophic failure there may well be extra costs to consider if any other associated plant were to have suffered damage as a consequence.

It should be clear that the more a plant is in a condition fit to support the production process compared to that same plant being unusable, is an indication of that plant's efficiency, which has a direct correlation to overall plant profitability. The higher the plant efficiency the easier it is to make a profit.

All plants, or components of an item of a plant, will eventually come to the end of their useful life. In other words it is a certainty that they will wear out at some stage no matter what maintenance strategy is in place. The time taken for an item of the plant or certain of its components to reach the end of their useful life can, of course, often be extended by the one maintenance technique with which we should all be familiar, i.e. efficient lubricating practices. The application of the appropriate lubricants applied in the correct manner at the appropriate frequencies and in an appropriate quantity, as well as being maintained at an acceptable quality where appropriate is well known to assist in reducing wear rates and extending component life.

Consequently, it could be argued that we already have the tools to help the industry increase plant efficiency to appreciable levels and indeed, reduce the associated maintenance frequencies.

It could be said, therefore, that the life of any plant, or its components, could be fairly accurately predicted based on the combination of past experience and good lubricating practices, and this is indeed the case, but such calculations are generally based on the plant operating at designed or, at the very least, known parameters. Adverse operating conditions, planned or otherwise, are not always taken into account and often, within the manufacturing industry, the plant does not operate within known or planned limits, dictated either by desirability, necessity, or accidentally, which is where assumptions on plant or component life can be a dangerous path to follow.

It stands to reason, one would assume, that for whatever situation it would be extremely beneficial to have an indication as to the condition of an item of plant, or its components, at any given time. Good maintenance engineers, who are responsible for the welfare of the plant and who usually have some form of financial accountability, do not want to be faced with unplanned maintenance or plant repairs which occur unexpectedly and without warning, as they will know that the associated costs will be significantly higher than a planned repair, due to the fact that there may well be associated damage, as mentioned previously, and there will also be additional downtime costs. As fate would have it, there are a lot of instances where such unplanned maintenance occurs at unsociable hours and this is generally not good for industrial relations although, as ever, there are exceptions »

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to this if the overtime rates negotiated are to some people's advantage.

It is also worth noting that failures to plant that have not been planned can also have a Health and Safety implication, as injuries to personnel may indeed occur due to the type and extent of the failure itself. This is obviously not good for the person suffering an injury but equally does no favours for the credibility of either individual plant managers or the company itself.

It would seem that a crystal ball would be distinctly useful in providing the information necessary, as the plant is running, to be able to plan maintenance effectively and efficiently thereby removing all of the pitfalls mentioned above which result from unexpected plant failures.

Condition monitoring techniques, applied correctly, can provide the manufacturing industry with that crystal ball, and assist greatly in switching the emphasis from Reactive Maintenance, or Run To Failure Maintenance, to Predictive Maintenance. Ultimately, a Pro-Active Maintenance strategy will hopefully ensue whereby knowledge gained from efficient condition monitoring techniques can identify the root causes of historical failure in any items of plant, or its components, and engineer them out. This technique is known as Root Cause Analysis.

By providing the manufacturing industry with the correctly applied condition monitoring techniques, we have the ability to increase plant efficiency and, more importantly, to increase plant profitability. There is, of course, the added bonus of potentially improving a particular plant's Health and Safety standing and related credibility.

It cannot be stressed enough that plant efficiency, and hence plant profitability, is not only attributable to the operating efficiency of individual items of the plant but of the process as a whole, and condition monitoring techniques can be applied plant-wide to ensure that the entire plant process is run as efficiently as is practically possible. This includes such ancillary services as the electrical supplies, compressed gases, vacuum services, steam, liquids, and others.

Condition monitoring is a natural partner to good lubricating practices and if we deem ourselves to be efficient and effective at one then it follows that we should be proficient at the other.

Indeed, results obtained from the analysis of specific condition monitoring techniques can directly affect the type of lubricant, the frequency of application, the quantity utilised, as well as the frequency of lubricant change which is, of course, based on its condition.

Therefore, serious consideration should be given to the more common condition monitoring techniques which are commercially available, such as Oil Analysis, Analytical Ferrography, Particle Counting, Vibration Analysis, Acoustic Emissions (Ultrasonics) and Thermography. Any reputable company involved in lubrication, or asset care management, at the very least, should be considering recommending and employing some of these where appropriate.

There are many different types of equipment that are commercially available to fulfill proper condition monitoring aspirations and it is extremely important to understand where these techniques can be effectively employed, as well as the benefits that can be derived.

Actual, or potentially verifiable cost savings to any business, which can be shown by the use of good condition monitoring techniques tend to show all parties in a very good light.

The impression is sometimes given that condition monitoring is such a complex subject, and perhaps even a black art, that only a gifted few could ever understand the intricacies of the many different techniques, let alone deploy some to their advantage. This myth will be dispelled in future articles and will go some way to making the subject more understandable. ■

We offer wide range of specialised lubricants:

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- Aviation applications
- High temperature application
- Bearings
- Synthetics

Sectors we are currently offering innovative solutions to:

- Paper corrugation
- Cement Industry
- Automotive sector
- Airlines and General Aviation
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LUBESOL KENYA LTD; Highchem Complex Mogadishu Road, Industrial Area Nairobi, Kenya. P.O. BOX 76099 – 00508 Nairobi, Kenya.
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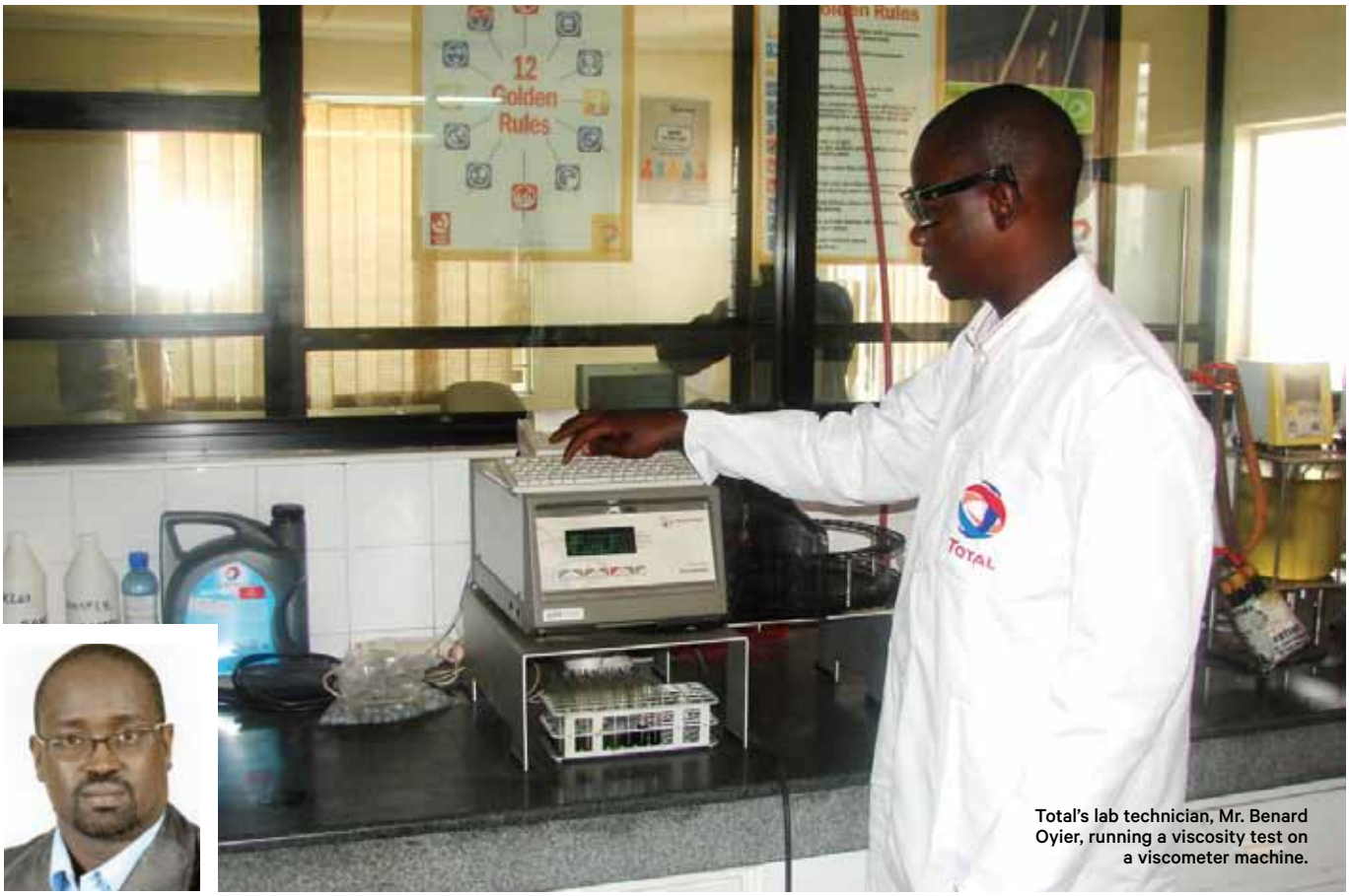
OIL ANALYSIS

Oil analysis – The Fundamentals



Total's lab technician, Mr. Benard Oyier, running a viscosity test on a viscometer machine.

By Ken Koskei
Ken Koskei is a Lubricants Technical & Training Manager at Total (K) LTD

What is oil analysis?

The analysis of lubricants for conformity and process control has always been important to manufacturers and users in providing a high-quality lubricant. Once the lubricant is in the equipment, degradation and contamination become critical measurements. The ability to measure a wide range of analyses cost-effectively can mean the avoidance of damaged equipment or changing the lubricant more frequently than necessary. The level of machine repair and proper lubricant renewal intervals can be precisely evaluated with measurements of additives and wear metals, contaminants and other oil components over the course of use. Machine life can be extended and lubricant costs reduced by proper testing.

The level of machine repair and proper lubricant renewal intervals can be precisely evaluated with measurements of additives and wear metals, contaminants and other oil components over the course of use.

Oil analysis is the evaluation of the oil itself and any contamination that is present. The information derived from the following tests looks for different types of wear and contamination. Each test looks at a different aspect of the oil. This is the reason for the different tests.

History of oil analysis

The first use of used oil analysis dates back to the early 1940s by the railway companies in the Western United States. Prompted by the purchase of a fleet of new locomotives, technicians used simple spectrographic equipment

and physical tests to monitor locomotive engines. As steam locomotives gave yield to diesel locomotives, oil analysis practices by railways caught on. By the 1980s oil analysis formed the basis of Condition Based Maintenance in most railways in North America.

Owing to the success of oil analysis in the railways, the American Navy used spectrometric techniques to monitor jet engines on their aircraft in the mid 1950s. Around this time Rolls-Royce was also experimenting with oil analysis for their jet turbines. Oil analysis began to spread and programs were developed by the American Army and Air Force throughout the 1950s and early 1960s. Then commercial oil analysis laboratories first appeared on the scene in the early 1960s.

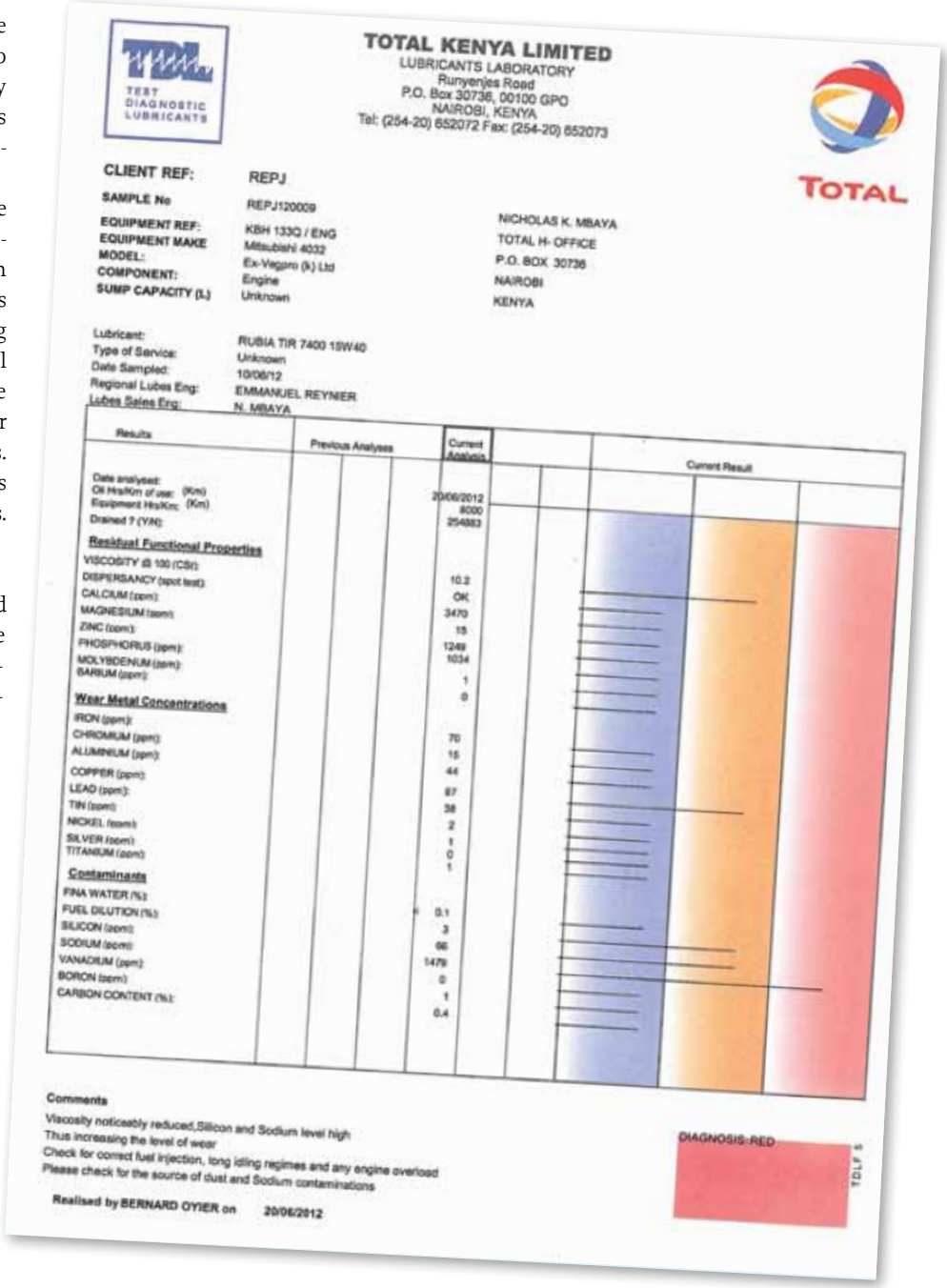
Benefits of Oil Analysis

Oil analysis is the most widely accepted and implemented form of proactive maintenance technology. It is an integral part of the maintenance plan for power plants, manufacturing plants, trucking companies, construction equipment, aircraft, refrigeration systems, processing and chemical plants, etc. Any piece of equipment that has a lubricating system is an excellent candidate for oil analysis. A successful oil analysis program requires an organized and sustained effort. Both the user and the laboratory must work closely together to achieve the desired results.

The benefits can be summarized as follows:

Almost any machine that has a lubrication system can be placed on an oil analysis program. Those components whose performance directly affects the continued operation of a particular unit or overall profitability of business are the most likely candidates for routine oil analysis.

- Monitoring of evolutions in the state of the oil.
- Assessment of the operating conditions of the machine.
- Reduction in maintenance costs.
- Planning of maintenance operations and reduction in downtime.
- Optimisation of oil drain frequencies.
- Verification that the lubricant used is the best adapted to the operating conditions.
- Determining the origin of possible contamination.
- Use in complementary mode of other condition based maintenance methods (vibration analyses, thermography, etc.)


TOTAL KENYA LIMITED
LUBRICANTS LABORATORY
Runyenjes Road
P.O. Box 30736, 00100 GPO
NAIROBI, KENYA
Tel: (254-20) 652072 Fax: (254-20) 652073

TEST DIAGNOSTIC LUBRICANTS

TOTAL

CLIENT REF: REPJ
SAMPLE No: REPJ120009
EQUIPMENT REF: KBH 133Q / ENG
EQUIPMENT MAKE: Mitsubishi 4032
MODEL: Ex-Vegpro (k) Ltd
COMPONENT: Engine
SUMP CAPACITY (L): Unknown

NICHOLAS K. MBAYA
TOTAL H- OFFICE
P.O. BOX 30736
NAIROBI
KENYA

Lubricant: RUBIA TIR 7400 15W40
Type of Service: Unknown
Date Sampled: 10/06/12
Regional Lubes Eng: EMMANUEL REYNER
Lubes Sales Eng: N. MBAYA

Results	Previous Analyses			Current Analysis	Current Result
Date analysed:				20/06/2012	
Oil Hrs/Km of use: (Km)				8000	
Equipment Hrs/Km: (Km)				254883	
Drained ? (Y/N):					
Residual Functional Properties					
VISCOSITY @ 100 (CSt):				10.2	
DISPERSANCY (spot test):				OK	
CALCIUM (ppm):				3470	
MAGNESIUM (ppm):				15	
ZINC (ppm):				1249	
PHOSPHORUS (ppm):				1034	
MOLYBDENUM (ppm):				1	
BARIUM (ppm):				0	
Wear Metal Concentrations					
IRON (ppm):				70	
CHROMIUM (ppm):				15	
ALUMINIUM (ppm):				44	
COPPER (ppm):				87	
LEAD (ppm):				38	
TIN (ppm):				2	
NICKEL (ppm):				1	
SILVER (ppm):				0	
TITANIUM (ppm):				1	
Contaminants					
FINA WATER (%):				0.1	
FUEL DILUTION (%):				3	
SILICON (ppm):				66	
SODIUM (ppm):				1479	
VANADIUM (ppm):				0	
BORON (ppm):				1	
CARBON CONTENT (%):				0.4	

Comments
Viscosity noticeably reduced,Silicon and Sodium level high
Thus increasing the level of wear
Check for correct fuel injection, long idling regimes and any engine overload
Please check for the source of dust and Sodium contaminations

Realised by BERNARD OYIER on 20/06/2012

DIAGNOSIS: RED

TDLF 5

Report sample

Sampling

The oil analysis depends entirely on the quality of the sample. The following rules should be respected to get a representative sample of the oil bath:

1. Take the sample when the oil is warm
2. Allow the « first oil » flow out (flushing) and take the sample at half bath
3. Put the oil STRAIGHT into the SAMPLING bottle.
4. Only use ORIGINAL sample bottles.
5. Always fill the bottle completely. The lab needs the whole volume of the sample.
6. Immediately close the bottle with the cap and identify it with the provided label.
7. Fill out the material identification form and put it together with the sample in the SHIPMENT envelope.

Typical Tests

The importance of using a combination of physical and spectrochemical tests to monitor lubricant and component condition is »

Table showing a summary of disorders detectable using oil analysis

Disorder	Impact	Intervention
High silicon content in combination with increased wear	**Dust or sand entering the engine through the air intake system causing abrasive wear in the engine**	Control of air filtration (filter, hoses, pipes)
High fuel dilution in combination with viscosity drop	**The oil loses its viscosity drop which may cause piston seizure and wear of the bearings**	Check the injection system (injections, returns, feed pump, injection pump)
Presence of water and/or antifreeze in the oil	**The water and antifreeze have a corrosive impact on the bearings and this may lead to a failure of bearings, leading to the loss of the engine**	The cooling system (head gasket, cylinder heads, injector seats, compressor, oil cooler... I should be checked on its tightness
Increase in soot concentration combined with viscosity increase	**Carbon matter can cause abrasive wear on the engine. The increased viscosity has a negative influence the lubrication and the fuel comsumption**	Check engine settings (injection, turbo) and check for obstructed air filter. Loss of compression may also result in high soot concentration.

»

now universally accepted. Oil analysis test procedures are established and reviewed by such agencies as the International Organization for Standardization (ISO), the American Society for Testing and Materials (ASTM) and the Society of Automotive Engineers (SAE), and a wide variety of laboratory and personnel certifications has emerged.

Physical Tests

Some of the physical properties tested for and usually included in analysis of an oil sample are:

- Coolant forms a gummy substance that may reduce oil flow. It leads to high oxidation, oil thickening, high acidity, and engine failure if not corrected.
- Fuel dilution thins oil, lowers lubricating ability, and might drop oil pressure. This usually causes higher wear.
- Oxidation measures gums, varnishes and oxidation products. High oxidation from oil used too hot or too long can leave sludge and varnish deposits and thicken the oil.
- Total base number generally indicates the acid-neutralizing capacity still in the lubricant.
- Total solids include ash, carbon, lead salts from gasoline engines, and oil oxidation.
- Viscosity is a measure of oil's resistance to flow. Oil may thin due to shear in multi-viscosity oils or by dilution with fuel. Oil may thicken from oxidation when run too long or too hot. Oil also may thicken from contamination by coolant, sugar and other materials

Spectrochemical tests

Selected metallic elements present as microscopic particles suspended in the fluid to be analyzed are identified and measured in parts per million by weight.

The analyzed elements are grouped into three main categories: i.e wear metals, contaminants and additives. These tests are done by emission spectroscopy. Though not exhaustive, the table below table gives an idea of the sources of chemical elements found in an oil sample.

The results

Results of the laboratory analysis are typically returned in two to seven days after the lab receives the sample. Results are returned to the owner for review. The laboratory may note when the analysis shows an abnormal condition and issue a caution or recommendation accordingly as per the diagnosis below.

Cost, Convenience and return on investment

Cost of oil analysis will vary according to the laboratory and extent of the analysis. Typical charges are $10 to $70 per analysis. The expense can easily be justified if it alerts the owner of a major problem that can be corrected and will help prevent downtime when the machine is needed.

Several companies have developed oil analysis kits that make oil analysis convenient. These kits include the sample bottles, suction pump and tubing, and possibly a pre-addressed, postage-paid mailing container.

The reasonable cost and convenience of oil analysis for use makes it another management tool that should be considered by anyone wanting to do preventive maintenance.

The return on investment is easily 15 to every Shilling spent. ■

'You cannot have high quality [lubricant] that is extremely cheap. Quality commands a premium, hence quality has been compromised in favour of low prices.' — *Jonathan Njine*

See story P.26

OIL ANALYSIS

Total Kenya Test Diagnostic Lubricants Laboratory

Inside Total Kenya Test Diagnostic Laboratory (TDL).

The Total Kenya Test Diagnostic Lubricants Laboratory (TDL) set up in 1999 serves Total clients within the Eastern Africa region - Kenya, Uganda, Tanzania, Rwanda, Burundi, Madagascar, Mauritius, Ethiopia and Southern Sudan. Strategically located in Nairobi, it is well linked to its clients. With a mean reporting cycle of 48 hours or less per sample, this Lab has kept the spirit of TDL alive and helped revolutionize the concept of Lubrication for many of its clients. It is certified under ISO 9001:2008 Quality Management System with a cumulative analysis base of more than 120,000. This

With a mean reporting cycle of 48 hours or less per sample, this Lab has kept the spirit of TDL alive and helped revolutionize the concept of Lubrication for many of its clients

has ensured reliability and consistency across its operational base. The analytical reports are transmitted on electronic mail to clients whenever alarming trends are observed to ensure prompt intervention. With its well-equipped structure, the Lab is also resourceful in addressing quality queries associated with Lubricants. The TDL concept will be upgraded to analysis compared (ANAC) by the end of 2012. ANAC will enable the clients to view their reports online, generate reports, trends and graphs in addition to more accurate diagnosis, thanks to its over 3.5 million data base for comparison purpose. Visit *www.total.co.ke ,www.anac-diagnosis.com* for more information. ■

SPOTLIGHT

Consumer choices lubricants survey – GFK

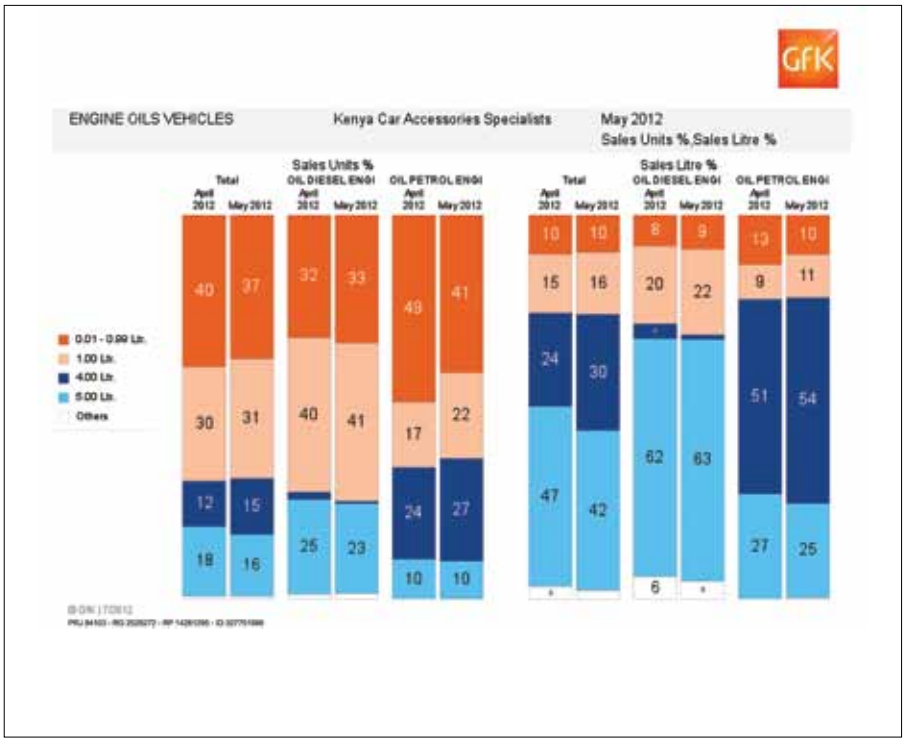
The Research industry in Kenya has been known more for the Opinion polls that seem to elicit as much support as criticism depending on what side of the political divide is favoured by the opinion polls results. Obviously, Lubezine is not changing its core focus from Lubricants business into politics! However, our interest was attracted to this particular firm due to a unique research project that they have started in Nairobi focusing on the Lubes business. We caught up the MANAGING DIRECTOR, MR. JOHN MUTHEE *(pictured left)* to give us more insight into this one-of-a-kind industry survey.

1. Briefly tell us who GFK is.

GfK is one of the world's largest research companies. 11,500 GfK experts are working to discover new insights about the way people live, think and shop, in over 100 markets, every day. We are constantly innovating to use the latest technologies and the smartest methodologies to give clients the clearest understanding of the most important people in the world: their customers. That knowledge empowers GfK's clients to make the right decisions, and position their businesses for the future.

GfK is an acronym that stands for Growth from Knowledge and has its Headquarters based in Germany. We are proud of our German heritage and are proud to bring to Kenya "Research Made in Germany!"

In Kenya, we have been present since 2006 from our Southern Africa office. In 2010, we set up a fully-fledged office handling research in Kenya, Uganda, Tanzania and Ethiopia.



2. What is GfK's scope of Research in Kenya?

GfK in Kenya was set up to with a focus on tracking sales of electronic consumer goods from Retail outlets. These products include Mobile phone handsets, TVs, Refrigeration and IT equipment. This research was driven by multinational companies manufacturing the above products.

In 2012, we made a conscious decision to start tracking products that would address the needs of the local industries. We approached some players in these sectors and undertook to understand whether there were any information gaps that existed that GfK had the capacity to address. After a series of meetings we selected Paints, Cement, Tyres and Lubricants and sectors that had information gaps that we had the capacity to address locally.

In February and March of this year, we undertook a study to understand the product flow of the above products from the manufacturers to the end consumers and identified channels that we believed that the largest gaps existed.

Interestingly, we found out that there were no universally agreed upon facts with regards

GfK is an acronym that stands from Growth from Knowledge and has its Headquarters based in Germany. We are proud of our German heritage and are proud to bring to Kenya "Research Made in Germany!"

to the total market especially with regards to market size, number of resellers and brands performance within these sectors.

In March 2012, we started a retail panel that is currently only limited to Nairobi as a first step to start collecting facts about these products.

3. Does GfK have experience in carrying out market research for the lubricants industry?

Yes! GfK is currently tracking Lubricants in Germany, Britain, Malaysia, France and we are glad to be the first country in Africa to start tracking lubricants. We have received necessary training to start the tracking of this product.

The basis of most research methodologies is based on the use of a sample to represent the universe within the distribution channels. Obviously, we have to take into consideration the variances that exist in the resellers markets in building up of a representative sample that is used to represent the market.

Our research involves the recording of all the SKUs sold in the shops within our market on a monthly basis and the SKUs are coded to reflect the features of the products sold and this is used to analyze the market.

4. What is the objective of the consumer choices survey?

Consumer Choices, as the name suggests aims at understanding what consumers purchased. This is important as all other factors e.g. promotions, advertisements can be tracked through the sell out from the channels. The success of any initiative can be ultimately measured by what it was to the final consumer. This is what we measure.

5. Briefly tell us what was measured by the survey

The following is the information that we are able to measure and report on trends by:

- Brand performance
- SKU performance
- Price trends
- Feature trends
- Packaging trends
- Numeric distribution
- Weighted distribution
- Regional performance – once we expand countrywide

6. Had such a survey ever been done before in the country?

We are 3 research companies in Kenya currently undertaking Retail Audit based on retail panels. GfK are the pioneers in tracking lubricant sales from the resellers market.

7. Market share reports by oil majors are generally available. What is the difference between this and the GfK report?

The current information on the sales is available at a global level and also based on self-reporting by the industry players.

GfK reports track all the brands sold in the market, and also track the sales at the SKU levels. We believe this information is critical for the success of companies who are interested in growing their revenue from the lubricants market.

8. How is the data gathered?

On a monthly basis, our field auditors collect the sales from the participating outlets. We insist that the information that is collected is validated from all the participating outlets. Another validation method used is through »

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Consumer choices lubricants survey – GFK

back checks to ensure that sales received are correct.

9. What kind of challenges do you encounter in data collection?

We encounter many problems in collecting data in the field. Obviously, the first one is convincing the reseller to share data with GfK. Usually we only achieve success after about 5 visits to be able to receive the data. Another challenge is of record keeping of the sales that is usually manually kept and extracting the information is time consuming.

We have been facing similar challenges in tracking of mobile phones and we have come up with ways in which we are able to address these challenges.

10. Who in your opinion would benefit from the results of your research?

The companies with a focus on lubricants in the resellers market are the main beneficiaries of our research.

We believe that using our information, a focus on consumer behaviour may lead to changes of the consumption patterns that would ultimately benefit the whole market.

11. What is your future plan for the region's lubricants industry?

At the moment we are preparing to undertake a basic census of all the outlets that are selling products that we are currently tracking which will include spare parts shops, petrol stations and any other outlets that are selling oil. At the moment, we are seeing some supermarkets selling lubricants. Our tracking should be able to track the growth of this channel. This information will be available to any player interested by October 2012.

At the moment, our tracking is based on the resellers market, specifically the spare parts shops, in Nairobi and its environment.

We are hoping to attract interest from the industry to ensure that the tracking is undertaken throughout Kenya that would allow us track the brand performance per region. ■

Mr John Muthee is the Managing Director, GfK East Africa. He can be reached at john.muthee@gfk.com

INNOVATIONS

New trends in lubricants packaging

By James Wakiru
James Wakiru is a lubricants and lubrication specialist and has been involved in lubricants market development activities for the past 12 years

Packaging is a very important marketing strategy to glamorize your product in order to attract the consumer's attention. Sometimes packaging is so important that it costs more than the product itself in order to lure the consumers to buy it. Packaging should definitely be included in the 4 major P's of marketing (Product, Place, Promotion and Price).

Most consumers judge a product by its packaging before buying. Some of the consumer requests as pertains packaging are:

1. Eye-catching appearance: A distinctive, unmistakable and eye-catching appearance is a signal at the POS (Point of Sale) to which all consumers and particularly the younger ones respond positively. Whatever stands out clearly in the monotonous competitive environment, whatever is surprising scores points with the consumer. Special effort makes a special impression - and is allowed to cost more too.

2. Design, shape and colour: The purpose of a well-considered design, and creative printing and finishing is to entice the consumer to devote attention to the pack and its contents at the POS.

3. Functionality: Functional aspects are the basis for all successful packaging and thus for greater product success too. Product and aroma protection, hygiene and tightness, environmental responsibility and practical handling (in both use and storage) are just as important here as ideas that improve comfort: closure mechanisms, portioning and see-through windows, for example.

4. Innovation: Novelty has exceptionally strong appeal. An innovative pack can even make "new products" out of familiar ones. Unusual solutions, functional new developments and originality not only set design trends but also boost sales!

5. Material: What is printed on board is read particularly willingly, while what is packaged in board sells particularly well. Sustainability, easy disposal and, above all, great design variety and potential are particular features of the material. Popular with consumers, particularly high appeal and many other advantages too.

6. Efficient communication: The packaging is the credible medium at the point of sale and is consulted willingly and intensively (see "Material"). This makes it an efficient means of communication and, in addition, one that gets closer to the consumer than all others. If several of his senses are appealed to as well, he can be persuaded particularly successfully.

7. Multisensory appeal: Anyone who approaches consumers via several of his senses attracts greater attention, intensifies perception and stimulates interest in buying. Packaging that can be felt, smelled and heard as well as looked at wins the customer's favour so much so that he is willing to pay a higher price for this multisensory appeal.

8. Appropriateness of the product: Packaging is considered to be an important indicator of quality. The quality of the product therefore has to be communicated by good packaging and not just by promises of quality made in the text on the packaging. A credible "overall work of art" is created as a result, in which the contents and the packaging are coherent and the consumer is convinced by

Did you know...

Ecobox uses 89 % less material compared to rigid plastic bottles. This offers a substantial decrease of land fill waste hence protecting the environment.

their consistency.

9. Value Packaging is an excellent way to communicate sophistication, class and value. This makes it an ideal strategic option for expressing premium positioning - as well as being the instrument of choice when a product needs to be upgraded or a brand needs to be revitalised. Products in classy packaging are particularly popular presents too.

10. Additional benefits: Successful packaging not only combines what is pleasant with what is functionally useful but also provides additional benefits. For example, as a gift or for presentation, with entertaining components or simply by making it possible to continue using the packaging for something else after the product has been consumed.

Shell Lubricants Drive Success with Ecobox (USA &CANADA)

Back in 1965, a winemaker in Australia had a novel idea. He decided that wine in a bottle was wasteful in many ways and thus came forward with the invention of boxed wine. While some applauded his innovative thinking, wine purists thought that the invention was all kinds of evil. 45 years later, Shell Lubricants has decided to reuse his idea in a totally different way by offering boxed motor oil. Shell describes its new packaging as, "an innovative product called Ecobox, an alternative to traditional plastic packaging for motor oil."

Shell Lubricants was keen to satisfy their customers' need for the most sustainable and ergonomic package for motor oil in the industry. Moreover, Shell also needed to respond to service operators' call for an easier-to-use, faster and more economical package. Therefore, the packaging format that Shell Lubricants was looking for was expected to provide significant versatile advantages over the traditional rigid packaging. This package is eco-friendly.

Shell Lubricants and Scholle Packaging developed a bag-in-box solution with radical improvements compared to the traditional rigid plastic bottles. The result of the Scholle-Shell relationship is Ecobox™ offering a wide range of benefits to the motor oil producer, retailer, and consumer. Ecobox™ is an example of a packaging solution that offers many more benefits than simply holding the product:

- Ecobox uses 89 % less material compared to rigid plastic bottles. This offers a substantial decrease of land fill waste hence protecting the environment.
- Ecobox ensures efficient utilization of storage space and transportation.
- Ecobox uniquely engineered box, bag and valve help owners and operators of oil change facilities to deliver oil to their customers with 99.9% efficient dispensing without surging, foaming, splashing or any product loss.
- The bag containing the oil in the Ecobox carton is designed to help improve speed and ease of use compared to bottles, as it requires less handling than quart bottles.

Shell's Ecobox

Currently Ecobox™ is available for Pennzoil®, Quaker State® and Shell Rotella® products in the US and Canada. Shell Lubricants has plans to eventually expand the Ecobox™ as a global offering for customers and consumers from all over the world to enjoy the unique benefits the system has to offer.

Engen Innovative Packaging Solution meets Bulk African Lube Supply Challenge

Engen, the African marketer of petroleum and petrochemical products, has launched the Innovative Packaging Solution (IPS) for safe, guaranteed quality, environmentally-friendly supply of lubricants in bulk in rural Africa. Engen partnered with Fluid-Bag of Finland to come up with this type of package.

The packaging system is designed to overcome the transit and storage challenges that come with large-scale supply (versus supply in drums or rental IBC's) of lubricants, grease and transformer oils, and features unique dispensing equipment designs to deal with the increased mass of product while also meeting quality standards.

Standards-dictated design

The 900-litre bulk lube bags feature inner containers made of a choice between aluminium foil, high-density polyethylene with specifications dictated by the application in question. The bag is designed to meet various aspects like preserving food-grade oil quality, offer grease resistance, prevent water ingress or bar oxygen or other gases, transport and dispensing of the oils.

Moreover, the pack offers the most environmentally-friendly disposal possible, containing carbons and hydrogen.

Bags are sealed and each unit has a unique serial number linked back to Fluid-Bag's quality system. This is due to the fact that each bag is leak tested with Nitrogen and quality checked prior to shipping to Engen in Durban.

Benefits and advantages

The IPS lube bag packaging system offers the following benefits and advantages:

- Cost-effective – it is single-use, meaning no return freight, cleaning or maintenance costs
- Convenient – one pack holds over four drums' worth of lubricant, for more lubricant on tap in less space (900L)
- Clean and safe – it's sealed, so contaminants don't get in
- It's environmentally friendly – made from non-toxic materials, the unit is entirely recyclable and reusable to transport used lubes
- The solution reduces the capital expenditure for bulk and dispensing equipment by 70%
- Logistic optimisation
- Light weight container (packaging total weight empty is below 38kg) – some 60% lighter than conventional IBC's. ■

Engen's innovative packaging solution (IPS)

OIL CHANGE

Oil degradation

By Jonathan Njine
Jonathan Njine is the MD of lubesol limited,. Lubesol are appointed distributors of various specialty lubricants.

Oil or lubricant degradation is the main reason why lubricants require being changed and is responsible for many kinds of equipment failures. A lubricant in service is subjected to a wide range of conditions which can cause degradation of its base oil and additive system. Such conditions or factors include heat, entrained air, incompatible gases, moisture, internal or external contamination, process constituents, radiation and inadvertent mixing of a different fluid. If an oil is used in a total loss application, where the oil is disposed after one cycle of lubrication, such as a drip-feed, picking up of moisture and dirt is not a factor, as the oil is used once then discarded. Left untreated, industrial oils will degrade over time, through exposure to external influences such as water, particles and dirt, through the breakdown of oil additives, and through the process of oxidation.

Contamination by particles

Most oils are used in enclosed systems or reservoirs, however, where they re-circulate through the operating system. As the oil re-circulates, it lubricates, cools and flushes away debris from normal wear particles and cleans the equipment parts. This wear debris, depending on the size of the particles, may settle in the oil reservoir, be removed by the filters, or simply be re-circulated, if it is too small to be removed. Sometimes, the wear debris can remain in the oil not settling as expected.

These particles not settled but still suspended in the oil, cause damage through abrasive wear each time they circulate through the lubrication system.

Research conducted over the past few years demonstrates that particles as small as 5 microns, when present in large quantities, will cause severe pump and valve wear by acting as a lapping compound.

Foreign substances can greatly influence the type and rate of lubricant degradation. Metals such as copper and iron are catalysts to the degradation process like oxidation. Water and air can provide a large source of oxygen to react with the oil. Large amounts of water would cause formation of sludges.

Dirt

Dirt can be introduced into the oil system by air and while charging in dirty oil. Most of dirt is introduced into the oil system through the air. Very few oil systems and reservoirs have air filters and if any, efficient air filters. Dirt particles light enough to float in the air are drawn into the reservoir every time the oil level in the tank goes down, by the breathing effect causing some of the dust particles to settle out into the oil.

Oil filter covered in sludge

Oil systems and reservoirs with levels that change frequently can pump many times their volume of air every hour. This exposes the oil in the tank to potentially very large amounts of dirt. This is how new oil delivered from most oil companies becomes contaminated with dirt as well.

Additives depletion

Most additive systems are designed to get used up in service. Monitoring additive levels is important not only to assess the health of the lubricant, but it also may provide clues related to specific degradation mechanisms. Monitoring additive depletion can be complicated and hard depending upon the chemistry of the additive component.

The additives present in most oils contain chemicals that work to extend the life of the oil. These consist mainly of antioxidants, rust inhibitors, anti-foam agents, de-emulsifiers, etc.

Water, heat and oxygen, individually or combined, cause damage to both the base oil and the additive system. Water reacts with many oil additives and hydrolyzes them, denaturing the additive into two or more chemical fragments. These reaction products may or may not be oil-soluble and they may act as catalysts for the further decomposition of the oil or additives.

Oxygen will react with the additives and the oil to form oxidation by-products. These by-products will generally be acidic in nature at first, and may act as catalysts for further oxidation.

Oxidation

Oxidation is the reaction of materials especially hydrocarbons with oxygen in the presence of heat or high temperature. Oxidation is the single most negative factor in extending lubricants life, hence controlling oxidation is a major challenge in trying to extend the lubricant's life.

The process of oxidation is naturally occurring in the oil, but the rate at which this happens depends on the following factors:

Did you know...

Based on the Arhenius Rule, for every 10°C increase in temperature above 40°C, the oil life is halved.

- Temperature – the higher the temperature, the shorter the oil life. Based on the Arhenius Rule, for every 10°C increase in temperature above 40°C, the oil life is halved.
- Moisture – the more water present the faster the oxidation rate
- Oxygen – the more oxygen from splashing induced by low oil levels the faster the oxidation rate
- Catalytic reactions – most typically from copper and other wear debris particles
- The quality of the base stock oil in terms of the levels of impurities
- The quality of the additive pack in terms of the anti-oxidants available to slow down the oxidation rate of the oil.

As the oil oxidises, there are two parallel problems arising:

- Firstly, as a result of the oil molecules reacting and joining together, the oil becomes thicker and darker. The heavier the molecules become, the heavier or thicker the oil gets.
- Secondly, a by-product of the oxidation is the formation of acids, which increases the risk of corrosion of component surfaces. A close examination of an old engine will reveal the chemical damage that is visible on the surface of the component.

Oxidation is mainly responsible for:

- Viscosity increase
- Varnish formation
- Sludge and sediment formation
- Additive depletion
- Base oil breakdown
- Filter plugging
- Loss in foam properties
- acid number increase
- Rust and corrosion

Antioxidants protect against oxidation only if they are present in sufficient quantities. When an antioxidant falls below a certain level it will become less effective. As it is further reduced, it will become completely ineffective.

Antioxidants are used up slowly under normal conditions. They protect by being consumed as they react with and neutralize oxidation products. Both heat and moisture will accelerate consumption of an antioxidant.

As the additive quantity falls below critical level , this is usually different for each oil, the rate of oxidation will increase. Oxidation by-products will act as catalyst in the oxidation process. This consequently means that the more by-products are present, the faster oxidation will occur.

Eventually, the level of oxidation will reach a point where the lubricant must be removed and replaced with new oil. Purification is not recommended at this stage as one is not be able to get the life of the lubricant again .

Thermal Breakdown

In a mechanical working environment, the temperature of the lubricant is a primary concern. In addition to separating the moving parts of the machinery, the lubricant must also cool the moving parts as it dissipates heat. This means the lubricant will sometimes be heated above its recommended stable temperature. Overheating can cause the light ends of the lubricant to vaporize or the lubricant itself to decompose. This can cause certain additives to be removed from the system without performing their job, or the viscosity of the lubricant may increase.

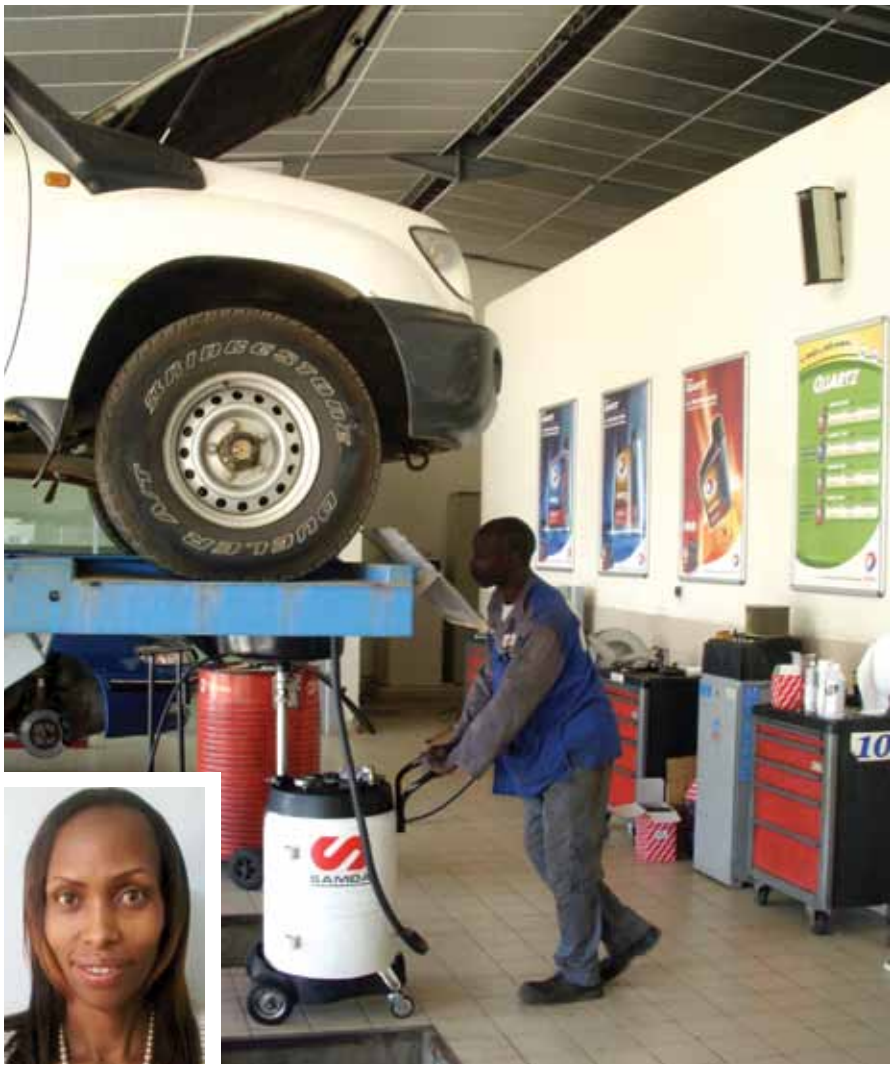
At temperatures greatly exceeding the thermal stability point of the lubricant, larger molecules will break apart into smaller molecules. This thermal cracking, often referred to as thermal breakdown, can initiate side reactions, induce polymerization, produce gaseous by-products, destroy additives and generate insoluble particles in the lubricant. In some cases, thermal breakdown or degradation will cause a decrease in viscosity of the lubricant.

Conclusion

Oil degradation is the main reason why oil change needs to be done. There are therefore all reasons for one to monitor the process and ensure all the causes of the degradation are reduced if not eliminated as this provides significant insight to the machine's or equipment's health. ■

EQUIPMENT

Lubrication equipment for a profitable and professional workshop



By Lucy Wanjohi

Lucy Wanjohi is a business development manager at Amity Equipment LTD. Amity is the authorized distributor of Samoa lubrication equipments in the country. She can be reached at ***lucie.wanjohi@amitykenya.com***

Neatness in an oil change workshop is an indication of professionalism and also a safeguard against accidents caused by oil spills. When oil is dispensed from the conventional 5L and 4L containers, spillages and generation of waste plastic containers will result. A professional workshop must therefore address these issues in the most cost effective manner. This is easily achieved by use of oil dispensing equipments.

All sectors of industry, both service and manufacturing require lubrication in form of oils or grease. Some of the typical applications are:

i. Automotive:

- motorbikes, bicycles,
- cars, trucks
- industrial vehicles
- service stations,
- tyre service stations
- Quick lube centre
- Fleet maintenance: Cars, buses, trucks, military vehicles, trains and trans ships

ii. Industrial :

- General machinery maintenance and manufacturing process
  - Assembling
  - machine
  - stamping,
  - metallurgy
  - chemical
  - General manufacturing

The Control of fluid usage and accurate fluid dispensing are priorities for a profitable workshop. Statistically, 10% of the lubricants used in a workshop are not charged to a customer but is lost as spillage.

Waste oil is an environmental and health hazard. The use of appropriate equipment eliminates spills and splashes and the risk of waste oil to skin contact.

Disadvantages of manual dispensing of lubricants

In a busy workshop, manual operations have been found to have the following disadvantages:

1. Manual operations is inconveniencing and costs Money:

- Every time Oil is taken out from the barrel , some spillage occurs
- When the oil is being measured some quantity will invariably be spilled.
- When the oil is poured into the vehicle, some will get spilled
- It is impossible to have accurate measurement all the time when using manual measuring devices hence revenues will be lost over time.

On average, if a workshop uses 10 barrels of lubricants per month the spillage per month is estimated to be about 63 litres.

On average, if a workshop uses 10 barrels of lubricants per month the spillage per month is estimated to be about 63 litres

2. Contamination of the environment

All the oil that is spilled during dispensing ends up polluting the environment. The spilled oil is cleaned with cotton waste and this is disposed in the dustbin. This trash is sent to the dump yard (oil is not degradable). When it rains, this water mixes with oil and seeps into the ground. Additionally, when the workshop floor is washed, the oil is washed into the ground. A study conducted by EPA (Environment Protection Agency in US) found out that 1 litre of oil can contaminate 50,000 litres of ground water.

Another way that the oil contaminates the ground water is when the extra oil remaining in the 5L or / 4L container is given to the customer and in most of the cases, the customer dumps it into the dustbin from where it finds its way into the ground water.

3. Loss of man hours

For every transaction, the technician is required to go to the store and get the oil can. Sometimes he is waiting for the delivery or gossiping. This process can take 15-20 minutes. For example, if in a workshop, oil change is done in 45 vehicles per day, then 45 x 20 min = 900 min is LOST man hours.

Factors to consider when choosing lubrication equipments

When considering oil change equipment, it is imperative to engage a team of experienced professionals to provide a comprehensive solution. Ideally such a team will:

1. Analyze the workshop requirements and advice on the equipment type and capacities
2. Give a comprehensive plan of the lubrication equipment solution
3. Install the equipment
4. Train the operators on proper usage of the equipment
5. Provide after sales service as and when required.

Fluids dispensed by Lubrication handling equipments

Lubrication handling equipments are able to handle a wide variety of fluids .These include:

- Grease
- Transmission fluid
- Coolant and antifreeze solution
- Diesel
- AdBlue (DEF)
- Compressed air
- Mineral and synthetic based motor oil, gear oil, hydraulic oil. ■

Lubricants handling equipment types

Typical lubricants handling equipment include:

1. Air operated piston pumps
These are mostly used for oils and greases

2. Diaphragm pumps
These are used for antifreeze, coolant and AdBlue

3. Electric pumps
These can be used for oil and also diesel

4. Hose reels
These enable oil to be dispensed far from where the oil is stored. They have been designed to withstand the high pressures carried by the system and also to be inert to the type of product being dispensed.

5. Hose end meters, delivery guns and high pressure greasing guns
The meters enable accurate measurements of the fluid being dispensed

6. Fluid and inventory management systems
It is possible to incorporate software in the lubrication system for more accurate monitoring of oil usage.

7. Mobile and stationary Equipment for waste oil collection
The system is not complete without waste oil collection system. Such units have pneumatic system that enables the oil to be pumped out into the waiting used oil collection/disposable facility.

Benefits of using lubrication equipment

Numerous benefits can be accrued from automation of the workshop:

- Increased profitability in the workshop (standard workshops can have 10% fluid losses)
- Increased Productivity (avoid stock rupture, accuracy in dispensed quantity)
- Quick Return on Investment (ROI)
- Workers control
- Robust and attractive design – good image to the customers.

10 QUESTIONS FOR LUBRICANTS PROFESSIONALS

We trace lubricants professionals who have made immense contributions to the growth and development of the industry and get their opinions on various issues. Mr. Jonathan Njine is one such professional who has and still continues to make notable contribution to the lubricants industry. We asked him 10 questions outlining his journey though the industry and his views on where the industry is headed.

1. Tell us when you started your career in lubricants.

I started my career in lubricants 15 years ago.

2. How many companies have you worked for and in what positions?

I have worked in Mobil as a Lubes engineer, a technical manager for the East Africa cluster, and as the quality and technical services manager for East & Southern Africa cluster and most recently as the technical manager for Africa at Libya Oil. Currently, I'm the Managing Director of Lubesol Kenya Limited.

3. I see you are still active in the lubricants industry

Yes, I'm still very actively involved.

4. Which were some of your most memorable moments in your career in the early years?

This must have been the opportunity to redesign a cement kiln and cement mill girth gear lubrication system from a grease system to a high viscosity synthetic lubricant system (ISO VG 6800)and hence reducing the plant annual consumption from about 30 drums of grease to 2 drums of the synthetic product.

5. During those early times, how was the country developing lubricants professionals?

We had local and international trainings that were initially general lubricant training and later sector-specific. For example, I was trained on power plants, cement plants, manned and aviation compressors among others. The training was both theoretical and practical and was offered in different parts of the world.

6. How was the industry then compared to now?

Previously, there were just a few players in the market and the drive was to maximise the customer's experience with the lubricant by saving them money through technical support. Today however, there are many more players in the market all competing for the same clients and therefore making the market more price-driven.

7. How competitive was the market then?

It was very receptive to technical support and high quality lubricants. It was also much more ethical as compared to now.

8. Looking back at those years and now, what would you say has been the biggest changes the industry has gone through?

There are many more players now and there is minimal focus on technical support. There is also an increase in price-driven supply with less technically trained personnel.

9. Looking at the market then and now, what is your comment in regards to quality and regulations in the lubricants industry?

Unfortunately, the regulations have not been air tight. There are plenty of products that are produced from recycled base stocks and low quality lubricants with quality claims that cannot be ascertained.

You cannot have high quality that is extremely cheap. Quality commands a premium, hence quality has been compromised in favour of low prices.

10. What would be your advice to young professionals thinking of starting a career in the lubricants field?

I would begin by telling them that it is an interesting career with many opportunities for training. To hone their skills, they should be prepared to spend time reading and researching in order to understand customers' equipments and match that with quality lubricants that keep the machine in good mechanical shape. In most cases, the cost of the equipment is so high that a compromise that would damage the equipment is unacceptable. ■

Jonathan Njine is the Managing Director of Lubesol Kenya Ltd. He can be reached on jonathan.njine@lubesol.com

GULF ENERGY SUGARPRESS BR

The ultimate solution in sugar mill lubrication

By Richard Mugambi
Richard mugambi is a lubricants engineer working with Gulf Energy.

In a sugar mill, lubrication of the mill bearings has over years been a major source of headache to many maintenance engineers. This is clearly so because of the operating environment, the very high loads on the mill bearings and the very low speeds that the mills rotate.

Lubrication of these bearings demands a product that is dispensed from a lube pump at various intervals in order to ensure reduced friction which further ensures the operating temperatures are below 50 degrees c for protection of the fragile brass material that make up these bearings. Since the lubricant is not collected in a sump like in most other applications for reuse, there is the requirement to minimize on volume consumed to avoid waste and the environmental challenges that come with disposal of used oil.

Balance between reducing friction, operating at minimal temperatures and reduced lubricant use, are the factors that a mill engineer has to contend with. Most of the products available in the market have not been able to satisfactorily offer this solution.

SUGARPRESS BR has been specially developed with this challenge in perspective. The product has very high viscosity of 20,000 cst @ 40 degrees celcius to ensure proper lube film is formed between the shaft and mill journals to reduce wear on the brass journals while carrying the very high mill loads. In addition, its high adhesion capability makes it possible to stick on the shaft while rotating at the very low speeds.

Top: Sugar press pump system in a mill lubrication. Left: Gulf Energy Sugarpress BR lubricant

This means little amounts of the product are used to keep the bearing cool and lubricated thereby reducing on the product consumption.

SUGARPRESS BR is biodegradable making it valuable to organizations that are environment conscious. To ensure rationalization of inventory, the product has the added benefit of being multi-functional. In addition to lubrication of the mill bearings, it fits well in lubricating crown pinions, bull gears and crystallizer wheels among other areas.

SUGARPRESS BR is the additional spanner in a maintenance engineer's toolbox when it comes to trimming the maintenance cost especially from a lubrication point of view. ■

OIL WORKLOAD

Engine oil performance in numbers

By Joseph Kitui
Joseph kitui has been working in the transport and logistics sector for close to 20 years

With the Olympics around the corner and looking at the eager and focused athletes preparing, one can hardly picture the simplicity and purity of nature such that winning or losing the medal depends on miniscule things. My favorite wonder in the human body is the knee joint which comprises of 3 bones that are not permanently connected to each other rubbing constantly and in different directions and still absorbing upwards of 250 strikes per kilometer equating to nearly 40 tons of force per knee. All this happens in the background of science and most people hardly ever notice until one day when climbing that stair or bending to tie the laces a cracking sound emanates and a whole lot of pain follows.

While not nearly comparable in magnanimity, oil in the engine suffers similar fate and is required to perform without breaking a sweat(and I mean that). Let's look at the numbers: a 4 cylinder vehicle engine with a piston stroke (distance between top and bottom positions of the piston) of 85mm turning at 1000rpms will require the piston to move up and down almost 50 meters per minute while rubbing on the surface of the cylinder. These may not be exactly spectacular numbers.

However, if you factor in that the vehicle will take a minimum of 10 hours to get to Mombasa on that holiday trip(driving within the speed limit!) the piston will travel upwards of 25,000km((85x2x250x60x10)/1000) equivalent to the equatorial diameter of the earth and still perform the following morning for that "drag" race with the tuk tuk guy over the New Nyali bridge...now are those spectacular numbers or what ...!

Remember the oil is the only thing that separates the piston rings from the cylinder liner surface and therefore protects the liner from being corroded and minimizes wear on the rings. It also carries out the function of cooling the engine (While we normally put water in the engine to cool it, the oil cools the pistons first and fast, the piston wallows in the oil constantly while burning at upwards of 600°C). The oil also deadens the noise in the engine.

With this at the back of our minds, the situation upfront under the hood suddenly looks very complex and one can therefore understand the hullabaloo of why oil change, grade and quality make so much difference. While Herr Otto and Herr Gottlieb barely scratch the surface in comparison with my favorite wonder, their design, with much improvements over the last 100+ years are amazing to say the least.

While their original designs probably had an oil change every week, there are now oils formulated to cover 20,000km between changes.

I will not try to work the numbers of such in comparison to our trip to the coast (they are too mind boggling), however the severity at which most engines take punishment can only be imagined.

Most engines are designed to outlive the users both in performance and durability. However, the difference between them doing so or not depends on the amount of TLC the engine and vehicle is given during its life.

To understand the forces at play in the engine versus the demands we put on the same, one begins to appreciate the herculean task that the oil does. It is the difference between a hard rock and another hard rock moving very fast! ■

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